K020489

MAY 14 2002

TOSOH MEDICS, INC.

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510(k) Summary

Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode

Submitter:	Tosoh Medics, Inc. 347 Oyster Point Blvd., Suite 201 South San Francisco, CA 94080 Phone: (800) 248-6764 Fax: (610) 615-4970
Contact Person:	Lois Nakayama Manager, Quality Assurance
Date of Summary Preparation:	February 8, 2002
Device Name:	G7 Automated HPLC Analyzer: Beta-thalassemia Mode
Classification Name:	Class II, JPD 21 CFR 864.7400 Hemoglobin A2 quantitation
Predicate Device:	HbA2: Beta-Thal HbA2 Quik Column™ Helena Laboratories Beaumont, TX K823870 HbF: VARIANT BETA-THALASSEMIA SHORT PROGRAM Bio-Rad Laboratories Hercules, CA K924122 Presumptive Hb identification: Beckman Paragon® Electrophoresis Beckman Instruments, Inc. Fullerton, CA K802821

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Device Description:

The G7 Automated HPLC Analyzer and the HbA1c Variant Analysis Mode reagent system and software have previously cleared by the Food and Drug Administration (K011434). The subject of this submission is merely the reagent system/software specific for the Beta-thalassemia Mode that is intended for the separation and area percent determinations of hemoglobins A2 and F and as an aid in the detection and presumptive identification of abnormal hemoglobins in whole blood using ion-exchange high performance liquid chromatography (HPLC).

The G7 Automated HPLC Analyzer - Beta-thalassemia Mode is an automated High Performance Liquid Chromatography (HPLC) system that separates and reports HbF and HbA2 quantitative percentages in whole blood. A chromatographic tracing of the hemoglobin products found in the sample is also produced which allows for the comparison of an individual chromatogram with standard patterns of known composition. The operational portion of the G7 Beta-thalassemia Mode is composed of a sampling unit, liquid pump, degasser, detector, microprocessors, sample loader, floppy disk drive unit, operational panel and a printer all of which have already been cleared by the FDA (K011434). The reagents and software program specific to the Beta-thalassemia Mode consist of calibrators, elution buffers, column and software only.

The G7 Automated HPLC System – Beta-thalassemia Mode uses a cation exchange column and separates the hemoglobin in the blood into fractions. The separation is accomplished by eluting the hemoglobins from the column with a gradient of three elution buffers containing increasing salt concentrations. The resulting report is printed out on the on-board printer and can be stored on a floppy disk in the on-board floppy disk drive. The data can also be transmitted to a host computer through the RS232 port. The result report includes a sample ID, date, time, area percentages and retention time in minutes of each individual peak detected. Peaks that meet the retention time "windows" pre-set in the software are labeled as F, A0, A2, D+, S+, C+. All others are designated in order of appearance as PXX and are listed in order of appearance.

All automated processes in the G7 Beta-thalassemia Mode are controlled by internal microprocessors using software downloaded via the on-board floppy disk drive.

Statement of Intended Use:

The G7 Automated HPLC Analyzer: Beta-thalassemia Mode is intended for IN VITRO DIAGNOSTIC USE ONLY for the separation and area percent determinations of hemoglobins A2 and F and as an aid in the detection and presumptive identification of abnormal hemoglobins in whole blood using ion-exchange high performance liquid chromatography (HPLC).

The G7 Automated HPLC Analyzer: Beta-thalassemia Mode reagents and software are intended only for use on the Tosoh G7 Automated HPLC Analyzer.

Substantial Equivalence:

Comparison Data

The **Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode** is substantially equivalent in intended use to instrument and reagent systems in commercial distribution

that are used to quantitate Hemoglobin A2 and Hemoglobin F in whole blood and qualitatively identify clinically important abnormal human hemoglobins.

Specifically, the **Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode** is substantially equivalent to the Helena Laboratories, Inc. (Beaumont, TX) Beta-Thal HbA2 Quik Column™ (K823870) method for quantitating Hemoglobin A2 and is substantially equivalent to the Bio-Rad Laboratories (Hercules, CA) VARIANT™ BETA-THALASSEMIA SHORT PROGRAM for quantitatiing Hemoglobin F (K924122) and to the Beckman Paragon® Hemoglobin Electrophoresis as an aid in identifying broad presumptive classes of abnormal human hemoglobins. A summary comparison of the capabilities and specifications of these systems is provided below in Table 1, Table 2 and Table 3.

Table 1
Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode HbA2
vs.
Helena Quik Column™ HbA2

	G7 Automated HPLC Analyzer: Beta-thal Mode	Beta-Thal HbA2 Quik Column™
Intended Use	Quantitative measurement of HbA2 in whole blood	Quantitative measurement of HbA2 in whole blood
Methodology	High Performance Liquid Chromatography using cation exchange	Micro-chromatographic technique using anion exchange
Separation Method	Based on differences in electrical charge between column material and hemogoblin molecule	Based on differences in electrical charge between column material and hemoglobin molecules
Sample Type	EDTA whole blood	EDTA whole blood
Microprocessor Controlled	YES	NO
Automatic Sampling	YES	NO
Elution Method	Buffers with differing salt concentrations causing an elution gradient	Buffers with differing salt concentrations causing an elution gradient
End Point	Colorimetric measurement at 415 nm	Colorimetric measurement at 415 nm
Results	Quantitative HbA2 Area %	Quantitative HbA2 Area %
Normal Reference Interval	1.7 – 2.9 %	2.2 – 3.3 %
Imprecision	2.4 – 3.3 %	3.25 %
Upper Linearity Limit	Up to 12.8 %	Not given

Table 2
Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode HbF
vs.
Bio-Rad Laboratories VARIANT™ BETA-THALASSEMIA SHORT PROGRAM HbF

	G7 Automated HPLC Analyzer: Beta-thal Mode	VARIANT™ BETA-THALASSEMIA SHORT PROGRAM
Intended Use	Quantitative measurement of HbF in whole blood	Quantitative measurement of HbF in whole blood
Methodology	High Performance Liquid Chromatography using cation exchange	High Performance Liquid Chromatography using cation exchange
Separation Method	Based on differences in electrical charge between column material and hemogoblin molecule	Based on differences in electrical charge between column material and hemoglobin molecules
Sample Type	EDTA whole blood	EDTA whole blood
Microprocessor Controlled	YES	YES
Automatic Sampling	YES	YES
Calibration	One Point Dual Analyte Calibration	One Point Dual Analyte Calibration
Automated Sample Pretreatment	YES	NO
Elution Method	Buffers with differing salt concentrations causing an elution gradient	Buffers with differing salt concentrations causing an elution gradient
End Point	Colorimetric measurement at 415 nm	Colorimetric measurement at 415 nm
Results	Quantitative HbF Area %	Quantitative HbF Area %
Normal Reference Interval	0.5 – 1.9	2.2 – 7.7 %
Imprecision (Intra-assay)	2.2 – 7.7 %	Not given
Upper Linearity(Reportable)	Up to 35.0 %	Up to 40%

Table 3
Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode
vs.
Beckman Paragon® Hemoglobin Electrophoresis

	G7 Automated HPLC Analyzer: Beta-thal Mode	Hemoglobin Electrophoresis
Intended Use	Aid in the identification of abnormal human hemoglobins	Electrophoretic separation of human hemoglobins to screen for clinically important hemoglobin variants
Methodology	High Performance Liquid Chromatography using cation exchange	Electrophoresis
Separation Method	Based on differences in electrical charge between column material and hemogoblin molecule	Based on differences in electrical charge between the media and hemoglobin molecules
Sample Type	EDTA whole blood	EDTA whole blood
Microprocessor Controlled	YES	NO
Automatic Sampling	YES	NO
Calibration	Software "windows" for various hemoglobin components are preset	Comparison of unknown with samples of known content
Automated Sample Pretreatment	YES	NO
Elution Method	Buffers with differing salt concentrations causing an elution gradient	Buffers with differing salt concentrations causing an elution gradient
End Point	Colorimetric measurement at 415 nm	Densitometer quantitation or visual interpretation of patterns obtained
Results	Presumptive identification of certain hemoglobin variants as "A", "F", "S", "C", and "D" or "unknown"	Qualitative presumptive identification of hemoglobin variants "A", "F", "S", "C" or "unknown"
Normal Reference Interval	Compared to "normal" pattern	Compared to "normal" pattern

Comparative Analysis

Comparative Analysis Quantitative HbA2

Patient specimens were analyzed using the **Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode** and another commercially available quantitative HbA2 assay utilizing a micro-chromatographic methodology (Helena Laboratories' Beta-Thal HbA2 Quik Column™. Approximately one-half the samples had HbA2 within the normal reference interval. The remainder showed elevated results. The comparison yielded the following correlation statistics when the two methods were compared using linear regression analysis:

Slope:	0.9318
Y-Intercept:	-1.08
Correlation Coefficient:	0.9318
Range of Samples (%):	1.6 – 7.4%
n:	75

Comparative Analysis Quantitative HbF

Patient specimens were analyzed with the **Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode** and another commercially available quantitative HbF assay utilizing HPLC (Bio-Rad Laboratories VARIANT BETA-THALASSEMIA SHORT PROGRAM. The comparison yielded the following correlation statistics between these two methods.

Slope:	0.778
Y-Intercept:	1.15
Correlation Coefficient:	0.9906
Range of Samples (%):	0.5 – 67.6
n:	57

Qualitative Comparison of Hemoglobins in Clinical Samples

Whole blood from patients suspected of having hemoglobinopathies were tested on the G7 Automated HPLC Analyzer: Beta-thalassemia Mode and the Beckman Laboratories Paragon® Hemoglobin Electrophoresis. Results from these qualitative comparisons are listed below.

G7 Presumptive Result	Electrophoresis Result	Number of Analyses
HbA/HbS*	HbA/HbS*	37
HbA/HbS*/HbA2*	HbA/HbS*/HbA2*	1
HbF*/HbS*	HbF*/HbS*	1
HbS*/HbC*	HbS*/HbC*	2
HbA/HbC*	HbA/HbC*	11
HbA/HbC*/HbF*	HbA/HbC*/HbF*	1
HbA/HbS*/HbF*	HbA/HbS*/HbF*	1
HbA/HbD*	HbA/HbD*	7
HbA/HbD*/HbF*	HbA/HbD*/HbF*	1
HbA/Hb Unknown	HbA/HbE*	5
HbA/unknown coeluting with HbA2* (47.2%)	HbA/unknown	1
HbA/HbF*/Unknown fast*	HbA/HbF*/Hb Barts*	1
HbA/Hb Unknown*	HbA/Hb unknown*	1
HbA/HbA2*/HbF*	HbA/HbA2*/HbF*	3
HbA/HbA2*/HbF	HbA/HbA2*/HbF	9
HbF*/HbA/HbA2	HbF*/HbA/HbA2	7
HbF*/HbA/HbA2*	HbF/HbA/HbA2*	6
HbA/Hb Unknown*	HbA/HbG*	5
Normal HbA/HbF/HbA2	Normal HbA/HbF/HbA2	55
	TOTAL COMPARISONS	**155**

Precision studies demonstrated intra-assay precision % CVs on HbF of 4.3 – 13.5% and on HbA2 from 1.3 – 2.1 %. Between day precision CV%s of2.2 – 7.7% on HbF and on HbA2 2.4 – 3.3 %. Recovery studies performed on HbF and HbA2 showed recoveries ranging from 99.4% - 107.1%.

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Conclusion:

Considering the excellent correlation between the Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode and the other predicate devices listed above, it can be concluded that the G7 Automated HPLC Analyzer: Beta-thalassemia Mode is substantially equivalent to the other predicate devices which have been 510(K) cleared. Based on the establishment of substantial equivalence, the safety and effectiveness of the Tosoh G7 Automated HPLC Analyzer: Beta-thalassemia Mode is confirmed.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Food and Drug Administration
2098 Gaither Road
Rockville MD 20850

MAY 1 4 2002

Ms. Lois Nakayama
Manager, Quality Assurance
TOSOH Medics, Inc.
347 Oyster Point Boulevard, Suite 201
South San Francisco, California 94080

Re: k020489
Trade/Device Name: G7 Automated HPLC Analyzer: Beta-thalassemia Mode
Regulation Number: 21 CFR § 864.7400
Regulation Name: Hemoglobin A2 quantitation
Regulatory Class: II
Product Code: JPD
Dated: April 29, 2002
Received: May 1, 2002

Dear Ms. Nakayama:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

This letter will allow you to begin marketing your device as described in your 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801 and additionally 809.10 for in vitro diagnostic devices), please contact the Office of Compliance at (301) 594-4588. Additionally, for questions on the promotion and advertising of your device, please contact the Office of Compliance at (301) 594-4639. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR 807.97). Other general information on your responsibilities under the Act may be obtained from the Division of Small Manufacturers International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its internet address "http://www.fda.gov/cdrh/dsma/dsmamain.html".

Sincerely yours,

Steven Gutman

Steven I. Gutman, M.D., M.B.A.
Director
Division of Clinical
Laboratory Devices
Office of Device Evaluation
Center for Devices and
Radiological Health

Enclosure

TOSOH MEDICS, INC.
TOSOH

PREMARKET NOTIFICATION

INDICATION FOR USE STATEMENT

G7 Automated HPLC Analyzer: Beta-thalassemia Mode

The G7 Automated HPLC Analyzer: Beta-thalassemia Mode is intended for IN VITRO DIAGNOSTIC USE ONLY for the separation and area percent determinations of hemoglobins A2 and F and as an aid in the detection and presumptive identification of abnormal hemoglobins in whole blood using ion-exchange high performance liquid chromatography (HPLC).

The G7 Automated HPLC Analyzer: Beta-thalassemia Mode reagents and software are intended only for use on the Tosoh G7 Automated HPLC Analyzer.

(Division Sign-Off)
Division of Clinical Laboratory Devices

510(k) Number K020489

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